WARTIME TEST AND EVALUATION; INITIATIVES LEAD TO CULTURAL CHANGE

BY

LIEUTENANT COLONEL SHANE DIETRICH
United States Army

USAWC CLASS OF 2007

U.S. Army War College, Carlisle Barracks, PA 17013-5050

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)* 14-05-2007	2. REPORT TYPE Civilian Research Paper	3. DATES COVERED *(From - To)* 14 Aug 2006 – 14 May 2007

4. TITLE AND SUBTITLE

Wartime Test and Evaluation; Initiatives Lead to Cultural Change

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Lieutenant Colonel Shane Dietrich, USA

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

The Institute of Advanced Technology
The University of Texas at Austin
3925 West Braker Lane, Suite 400
Austin, Texas 78759-5316

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Mr. Robert Riffle
The Institute of Advanced Technology
The University of Texas at Austin
3925 West Braker Lane, Suite 400
Austin, Texas 78759-5316

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

DISTRIBUTION A: UNLIMITED

13. SUPPLEMENTARY NOTES

The views of the academic research paper are those of the author and do not reflect the official policy of the U.S. Government, the Department of Defense, or any of its agencies.

14. ABSTRACT

This paper provides a review of the initiatives and processes implemented by the US Army Test and Evaluation Command (ATEC) to support wartime rapid acquisition while building a context for the impact initiatives implemented by ATEC have had within the test and evaluation (T&E) community. Ultimately it looks at ATEC's wartime T&E experience and its relevance to cultural change within the T&E institution, a concern leading to the 2005 Defense Acquisition Performance Assessment (DAPA) Project commissioned by the Honorable Gordon England, Deputy Secretary of Defense. The paper concludes with recommendations for further study and consideration.

15. SUBJECT TERMS

Wartime Test and Evaluation, US Army Test and Evaluation Command, Rapid Acquisition Initiatives, Acquisition Reform, Cultural Change, Organizational Behavior

16. SECURITY CLASSIFICATION OF:

a. REPORT	b. ABSTRACT	c. THIS PAGE	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON LTC Shane Dietrich
UNCLASSIFED	UNCLASSIFED	UNCLASSIFED	UNLIMITED	36	19b. TELEPHONE NUMBER *(include area code)* (512) 232-4566

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

CIVILIAN RESEARCH PROJECT

WARTIME TEST AND EVALUATION; INITIATIVES LEAD TO CULTURAL
CHANGE

by

Lieutenant Colonel Shane Dietrich
United States Army

Mr. Robert Riffle
Program Adviser
The University of Texas at Austin

US Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

ABSTRACT

AUTHOR: LTC Shane Dietrich

TITLE: Wartime Test and Evaluation; Initiatives Lead to Cultural Change

FORMAT: Civilian Research Project

DATE: 14 May 2007   WORD COUNT: 14,007   PAGES: 36

CLASSIFICATION: Unclassified

This paper provides a review of the initiatives and processes implemented by the US Army Test and Evaluation Command (ATEC) to support wartime rapid acquisition while building a context for the impact initiatives implemented by ATEC have had within the test and evaluation (T&E) community. Ultimately it looks at ATEC's wartime T&E experience and its relevance to cultural change within the T&E institution, a concern leading to the 2005 Defense Acquisition Performance Assessment (DAPA) Project commissioned by the Honorable Gordon England, Deputy Secretary of Defense. The paper concludes with recommendations for further study and consideration.

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGMENTS

WARTIME TEST AND EVAULATION; INITIATIVES LEAD TO CULTURAL CHANGE

Introduction

This is a study in organizational behavior, a look at an organization that generated a synergy to support an Army at war, and in the process created a cultural climate embracing acquisition reform and posturing itself for success. This is a study of the Army Test and Evaluation Command (ATEC) in support of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF), conflicts ongoing at this time.

While researching policy for test and evaluation (T&E), Larry Miller, Deputy Director for Live Fire, Office of the Secretary of Defense (OSD), Director of Operational Test and Evaluation (DOT&E) made a statement that intrigued me. He said ". . . the problem is not with US Code Title 10 and other policy, but with we who interpret it". He in essence implied US Code Title 10 created an institution resistant to change [1]. Mr. Thomas Christie, former Director of DOT&E presented a similar conclusion in his February 2006 article "What Has 35 Years of Acquisition Reform Accomplished?" [2] whereas he asserts the failure to reform is not a product of the Department of Defense (DoD) directives and policy but with the failure of the acquisition community to carry out the letter and intent of those directives and guidelines [3]. I revised my focus to researching ATEC's wartime T&E initiatives during the Global War on Terror (GWOT) resulting in a cultural change within ATEC; and consequently, identify how it may serve as a catalyst for changing the T&E institutional culture.

The GWOT and more specifically, combat actions in Iraq and Afghanistan saw the emergence of a highly adaptive, lethal enemy which caused the acquisition community to become proactive and responsive to those engaged in the fight. The need for rapidly fielded technical solutions in response to changing tactics and threats used by our enemies arguably caused the greatest changes in fielding equipment to an Army at war. According to the Honorable Kenneth J. Krieg, Under Secretary of Defense for Acquisition, Technology and Logistics, speed and responsiveness to the customer is driven by a new competitive environment whose focus should be upon rapid acquisition of capability, not simply systems. He calls for a more customer centric focus, the application of different rule sets to meet customer needs, and a challenging of business practices [4]. He emphasized the necessity of speeding our evolution

toward greater interoperability and interdependency for systems deployed to the battlefield while ensuring the integrity of the systems' credibility, testing and training [5].

Since 2002, organizations such as the Combating Terrorism Technology Task Force (CTTTF), the Rapid Equipping Force (REF), the Joint Rapid Acquisition Cell (JRAC), and, following the exploitation of the improvised explosive devise (IED) by our enemy, the Joint IED Defeat Organization (JIEDDO) emerged to identify potential solutions and get them in the hands of deployed Soldiers and Marines. The service T&E organizations evolved with them, providing test facilities and expertise while establishing partnerships and procedures to expedite assessing, testing, evaluating and reporting of systems and technologies in record time compared to traditional acquisition timelines.

According to Brian Simmons, Director of the Army Evaluation Center (AEC) and former Deputy Commander and Technical Director, US Army Developmental Test Command (DTC), significant changes in T&E are occurring right now, and as a result of that change, the future for T&E will emerge to be quite different than previously predicted[6]. He specifically highlights the following examples:

> (1) The systems acquisition and associated T&E process has changed during wartime and is unlikely to return to the traditional process when the war is over, (2) Business transformation demands more efficiency in T&E processes now, (3) Networked testing requires the testers to rely on each other as opposed to staying in traditional Service, local test range or developmental test (DT)/operational test (OT) domains [7].

More importantly, Simmons states changes will come from within the institution [8].

Some of the most responsive changes occurred within ATEC. Most important are the creation of an 'Army at War' climate by Major General (MG) James Myles, the ATEC Commander, which resonated throughout the command, a transformation of business practices to provide essential testing for a diverse mix of rapid acquisition programs, and the development of an expeditionary mindset to respond to requests from the field [9].

In September 1999, the Defense Science Board (DSB) Task Force released its report on a broad review of the entire range of activities relating to T&E. Their summary recommendations included: start T&E early - very early; make T&E part of the acquisition process - not adversarial to it; consolidate DT and OT; provide joint test leadership; maintain independence of evaluation process while integrating all other activities; and, establish range ownership and operation

structure separate from the Service DT/OT organizations [10]. Since then, the Government Accounting Office (GAO), a follow on DSB recommendation, and the 2005 Defense Acquisition Program Assessment (DAPA) project have validated the need for those same practices. It is my assertion that wartime T&E accelerated the implementation of these recommended "best practices" within the Army and consequently, may serve as a catalyst to change both the organizational and institutional culture within the DoD T&E community.

Purpose and Organization of the Paper

The purpose of this paper is three-fold: First, to tell the ATEC story during OEF and OIF which builds the framework for my analysis. Second, identify ATEC's rapid acquisition T&E initiatives for future use by other service T&E organizations. Third, to analyze the changes that occurred in ATEC and subsequently how it prepared the command for future operations in peacetime and at war. The relevance of this approach is to look at the potential for changing the T&E culture for the future.

The research question posed is "Can ATEC's wartime test and evaluation experience influence a cultural change within the command?" The dependent variable is cultural change, the phenomenon I want to explain. The independent variable is ATEC's wartime T&E experience; those wartime T&E factors that influence cultural change. My research consists of literature reviews on organizational cultural change, rapid acquisition initiatives, and ATEC during the GWOT. I conducted personal interviews of ATEC key leaders during the period 5-9 March, telephonic interviews over a longer period, and included comments from guest speakers with their verbal approval. Since quantitative data is unavailable, my analysis is qualitative in nature. It is important to note that most rapid acquisition programs are classified in nature and the examples I use intentionally lack specific detail, my comments easily verified in open source.

The paper is organized in the following manner. Rapid acquisition in support of OEF and OIF is discussed first. For the purpose of my research, I will only discuss the Rapid Fielding Initiative (RFI), the REF, and the JIEDDO organizations as these three topics build a context for understanding the major reasons T&E support to the Combatant Commanders drove major changes within ATEC. Next will be an analysis of the Army T&E initiatives implemented to support both the war effort and external demands for change while conducting wartime

operations. We will ultimately look at ATECs' wartime T&E initiatives and its relevance to cultural change within the institution. The paper concludes with recommendations for further study and consideration.

Rapid Acquisition in Support of the Warfighter

During the buildup and deployment of forces to Afghanistan and Iraq, T&E support to the force was business as usual until it was clear that the mountainous fight against the Taliban in Afghanistan and the insurgency entrenched in urban Iraq required the rapid fielding of non-standard equipment to combat units in theater and to those units preparing to rotate in behind them. In their book "The Cultures of Work Organizations", Harrison Trice and Janice Beyer provide eight considerations to keep in mind when changing organization cultures. The first of these considerations is *Capitalize on Propitious Moments* [11]. Rapid acquisition in support of the Army at war served as the propitious moment in which ATEC changed the way it conducts business, and the longer combat actions continue in the GWOT, the greater number of acquisition programs to be expedited to the field and the more the changes in ATEC will become cultural changes. The three areas I will discuss that impacted ATEC the most in support of the current fight are the RFI, REF and JIEDDO.

Raid Fielding Initiative

In response to reports in 2002 from soldiers in Afghanistan that they were spending their own money to buy commercially available items not received prior to deployment, General John M. Keane, the Army Vice Chief of Staff, directed that Program Executive Office (PEO) Soldier establish the RFI program to aggressively modernize individual and small unit equipment for active and reserve units throughout the operational Army. The initial core list of equipment was developed by commanders and senior noncommissioned officers assigned to the 82nd Airborne and 101st Airborne (Air Assault) Divisions operating in Afghanistan. PEO Soldier used the list to field an initial brigade set within 45 days. The current standardized list consists of more than 50 types of items [12].

Although much of the equipment is commercial off-the-shelf and government off-the-shelf, innovative approaches have been taken to meet deploying unit shortfalls. Army leadership, Congress and the Army Budget Office have supplied the resources and prioritization to rapidly

procure the equipment. The Training and Doctrine Command has generated operational needs documentation and coordinated basic and unit-specific requirements while ATEC has issued material releases and validations in rapid time compared to traditional testing processes [13]. The Army's goal is to equip all 864,000 soldiers in the operational Army with RFI equipment by the end of fiscal year 2007 for a total of 46 active and 34 reserve component brigade combat teams (BCTs) along with their support unit personnel. To accomplish their goal, PEO Soldier's RFI Operations Team travels the world to fit and equip soldiers and units [14].

Rapid Equipping Force

The Army's REF began in 2002 as an ad hoc effort to speed equipment to soldiers and became a permanent organization in 2005. Based at Fort Belvoir, Va., it has been assigned to the Army's Deputy Chief of Staff for Operations and Plans, and its personnel have increased from 14 in 2002 to approximately 150. The force's mission, unlike that of the traditional acquisition community, is to identify immediate, unmet needs of combat soldiers and satisfy those requirements within 90 to 180 days. By contrast, the Army's traditional process of developing and fielding equipment can take years as depicted in Figure 1 below which compares the timelines between the REF and the Army's formal fielding process [15].
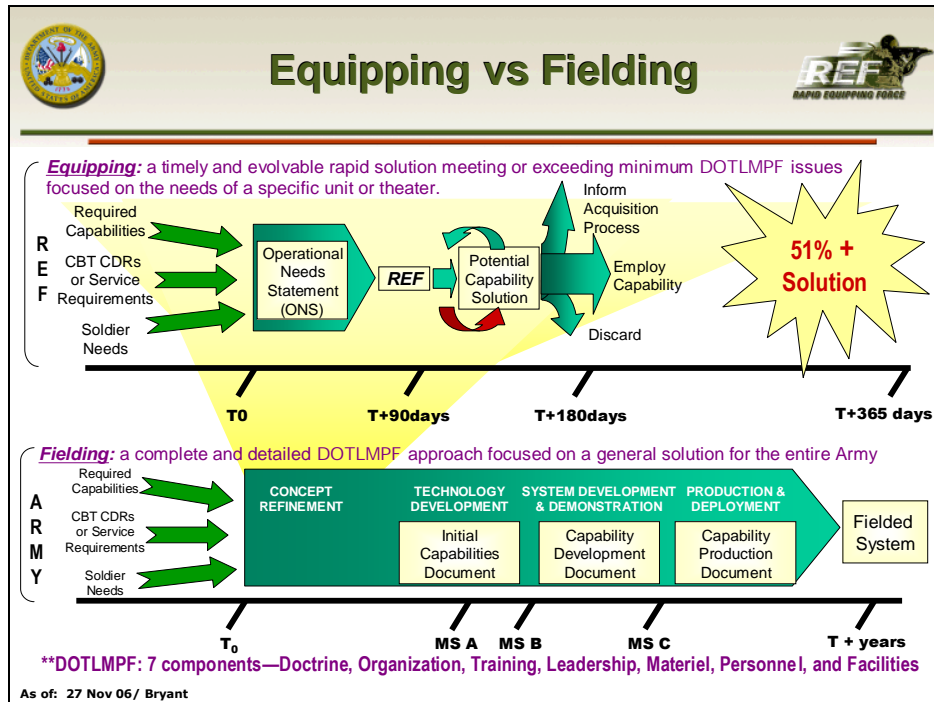
Figure 1. REF Equipping vs. Army Fielding Timeline.

Whereas the RFI discussed previously strives to provide the latest equipment to soldiers before they deploy [16], the REF works intently with combatant commanders in theater to meet unforeseen requirements that emerge unexpectedly on the battlefield, often resulting in purchases based on assessments from the REF's forward teams operating throughout Afghanistan, Iraq, and Kuwait.

In 2005 alone, the REF purchased more than 20,000 items, including robots, surveillance systems, digital translators and weapon accessories. The REF buys small quantities of the equipment and tests them at in-theater field laboratories. Finally, once equipment is issued to a unit, the in-theater forward teams follow up to assess how well it works [17].

The REF concept is to identify an immediate warfighting need, seek out the best way to meet it and quickly get the technical solution into the hands of the Soldiers who need it. In their most impressive responses, staff members have been able to fill several specific requests within just 48 hours. Rather than designing or developing a solution to a problem, the REF jump-starts the process by evaluating what's commercially available or in the production pipeline. By using

off-the-shelf technology, even if it needs modifications to satisfy military requirements, the REF is able to bypass the traditional acquisition process [18].

When the REF is unable find an off-the-shelf solution to a problem, it invents its own equipment or seeks assistance from military research laboratories such as Defense Advanced Research Projects Agency and the Army Research, Development and Engineering Command. Over time, the field identified a lack of logistics support for the equipment fielded by the REF so the REF now develops an acquisition and support plan for every item that it fields. Such plans are approved by the Army Materiel Command and detail how and when repairs should be made and where spare parts and replacements may be found [19]. The figure below (Figure 2) illustrates the REF project timeline broken out by activity [20].
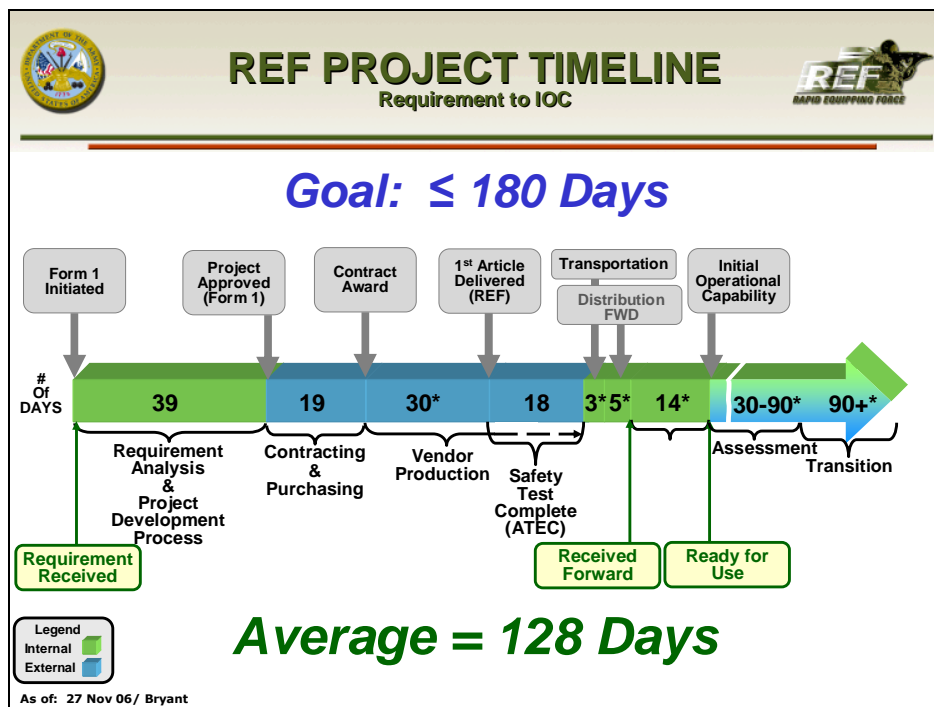
Figure 2. REF Project Timeline.

Note the short timeframe for the assessment or testing conducted by ATEC to produce a safety certification required prior to fielding of the item under test. One of the greatest challenges for ATEC's test centers in supporting the aggressive project timelines for rapid acquisition programs is the scheduling of resources and real estate while minimizing the impact to other systems

already scheduled.

Somewhat related to the REF but established to assist the joint service environment is the Joint Rapid Acquisition Cell (JRAC) which was formed in September 2004 at the direction of Deputy Defense Secretary Paul Wolfowitz. Its purpose is to help break through real or perceived roadblocks that delay getting lifesaving or mission-critical items or services to the field during the GWOT, potentially cutting months out of the traditional acquisition timetable [21].

Joint IED Defeat Organization

The DoD JIEDDO was established in 2006 having started out as an Army organization almost a year earlier. The organization is under the direction of retired Army General Montgomery Meigs and is part of the OSD. Since IEDs are the primary terrorist weapon used worldwide, the organization's focus is on the global IED threat, not just IED attacks against American troops in Iraq and Afghanistan. Terrorists around the world gather information on US counter-IED technology from open sources on the Internet and disseminate that information rapidly to devise new tactics and technologies to defeat American initiatives. The best way to defeat IED attacks is to reduce vulnerabilities that the insurgents can exploit such as the armoring of vehicles and fielding of counter-IED technologies.

JIEDDO now focuses specifically on the remaining vulnerability gaps and what new technologies industry can come up with to seal them completely. The JIEDDO's IED defeat strategy is focused on defeating the entire IED system, the insurgent network of bomb suppliers and makers, and the insurgents that emplace the devices [22]. Their strategy includes training the force.

The Army is in the process of standing up a new IED training school at the National Training Center, Fort Irwin, Calif. There they will educate troops deploying to Iraq and Afghanistan on the most recent insurgent IED technologies and tactics, and provide them with the latest counter IED technologies. According to Brigadier General (BG) Robert Cone, Commanding General, National Training Center, 20-25 man Observer Controller teams make a quarterly visit to theater, both Iraq and Afghanistan, to learn emerging tactics, techniques and procedures (TTP) being employed by both coalition forces and the insurgents [23]. Once a unit deploys, the JIEDDO sends a training team, familiar with insurgent IED tactics for a specific area, to accompany the unit for the first 45 days of their deployment to try and mitigate the steep

8

learning curve for newly arriving units, and minimize casualties as the unit gains a better feel for the enemy's tactics [24].

ATEC has worked closely with JIEDDO to provide credible, independent operational assessments and safety certifications when required to meet the JIEDDO time lines. DoD Directive 2000.19E dated 14 February 2006 not only established JIEDDO but established among other things a JIEDD Test Board (JTB) consistent with DoD Directives 5105.18 and 5105.4 which ATEC plays a principal role in synchronizing and coordinating all JIEDD T&E events while ensuring consistency in assessing, testing, and/or evaluating counter-IED technologies. ATEC has been instrumental in supporting all three missions discussed; the PEO Soldier RFI, REF and JIEDDO missions.

The Army Test and Evaluation Command

The ATEC Mission

ATEC plans, conducts, and integrates developmental testing, independent operational testing, independent evaluations, assessments, and experiments to provide essential information to Soldiers and into the hands of acquisition decision makers supporting the American Warfighter [25]. Since the beginning of the GWOT, ATEC's primary focus has been the support of wartime rapid acquisition programs.

ATEC Organizational Structure

On November 18, 1998, the Vice Chief of Staff of the Army approved consolidation of developmental and operational testing. That decision led to the redesignation on October 1, 1999, of the Operational Test and Evaluation Command (OPTEC) to ATEC. The Test and Evaluation command (TECOM) became a major subordinate command of ATEC and was redesignated the US Army Developmental Test Command (DTC) headquartered at Aberdeen Proving Ground, Maryland and the Test and Experimentation Command (TEXCOM) was redesignated the US Army Operational Test Command (OTC) to remain at Fort Hood, Texas. The third ATEC subordinate command that was redesignated encompassed both the Operational Evaluation Command and the Evaluation Analysis Center, which were combined to form the new US Army Evaluation Center (AEC), completing the earlier decision to move developmental and

operational evaluation into a single, integrated command. Figure 3 below illustrates the current ATEC organization structure [26].

Figure 3. ATEC Organizational Structure.

The significance of this reorganization was ATEC assuming overall responsibility for all developmental testing, independent operational testing, and the independent evaluation for the Army, the only full spectrum test organization within DoD. The T&E structures used by the other services still reflect separate DT and OT organizations although recommendations provided to DOT&E for greater combined DT/OT and earlier OT involvement have also recommended the consolidation of test organizations under a single command.

The locations for ATEC's major commands, developmental test centers, operational test directorates, and the ATEC liaison officer (LNO) locations including the expanded relationships as a result of wartime T&E to be discussed later are depicted in Figure 4 below [27].
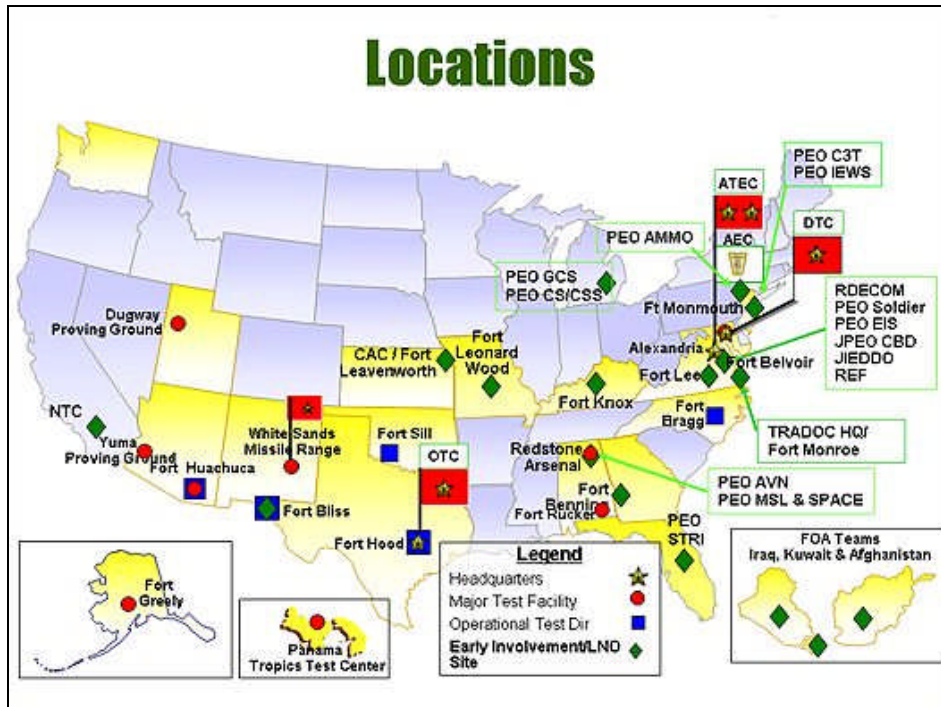
Figure 4. Current ATEC Locations.

The Forward Operational Assessment (FOA) teams depicted in the lower right shadow box above are in direct support of ATEC's wartime T&E mission and will be discussed in a later section of my paper.

ATEC Organizational Cultures prior to the Global War on Terror

The culture of an organization is unique and is a reflection of the values, beliefs and behaviors shared by the organizations members as well as a pattern of shared basic assumptions a group learns as it solves problems. Combined, they provide the interpretation of core beliefs and the basis by which decisions are made, acceptance is granted, rejection occurs, and truth determined [28].

The Army has no doubt conducted successful combined DT/OT test events prior to and since the consolidation of the two commands under ATEC. Since the consolidation, ATEC has placed increased emphasis on earlier OT involvement, collaboration between DTC and OTC, and conducting simultaneous DT/OT, but these events are the exception and not the norm in part

11

because ATEC's shared history is relatively young and the cultures within the DT and OT organizations are very different.

A macro-level generalization of each commands historical culture follows, and with no material to analyze or reference, the discussion is based on my observations from more than seven years while assigned to the command (TEXCOM from1995-1996; OTC from 2000-2003; and DTC from 2003-2006), and the inclusion of feedback from more than twenty military and civilian current and former ATEC employees.

One of the chief complaints among the DT side of ATEC is that the ATEC headquarters is "OT centric", an understandable perception since the headquarters was formed from the old OPTEC headquarters and the leadership, both military and civilian, were often "pulled up" from TEXCOM, the OT subordinate command at Fort Hood. This perception is changing, in part because of the Senior Executive Service (SES) personnel moves that occurred during the past six months which redistributes the commands senior civilian leadership, broadens their experience, and informally sends a new message to the workforce that the command is one team, no longer "OT centric", and more importantly, changing because of the command's shared wartime experience over the past four years.

Army Evaluation Center

Based on feedback received from senior personnel within AEC, the Operational Evaluation Command and the Evaluation Analysis Center were two similar organizations and the merging of the two organizational cultures, personnel, analysis methodologies, processes, and determination of analysis tools has been a relatively transparent transition to the rest of the command.

Developmental Test Command

Developmental testing consists of a test, fix, test series of activities throughout the early developmental stages of a program forming a partnership with the material developer, program manager (PM) and industrial contractor utilizing their services; all of whom are considered to be 'customers'. There are countless examples of testers identifying problems and fabricating interim material solutions in order to continue testing while the material developer makes permanent production changes.

12

DTC consists of seven test centers historically linked to the Army's material developers. The seven test centers are: Aberdeen Proving Ground (APG), Maryland; Dugway Proving Ground (DPG), Utah; Electronic Proving Ground (EPG), Arizona; the Aviation Technical Test Center (ATTC) and Redstone Technical Test Center (RTTC), currently consolidating in Huntsville, Alabama per a 2005 Base Realignment and Closure (BRAC) decision; Yuma Proving Ground (YPG), Arizona; and White Sands Missile Range (WSMR), New Mexico, and each specializes in different DT mission areas with long standing customer relationships.

Five of these test centers are categorized as DoD Major Range Test Facility Base (MRTFB) installations and operate as competitive, reimbursable-based businesses. Each center competes with test facilities and laboratories that exist in both industry and throughout DoD, ultimately providing "best value" to the customer. In the typical pre-GWOT non-rapid acquisition test process, DT takes the system to a point at which the PM hands the system under test (SUT) to a representative operational unit for training and OTC for the conduct of the independent OT event. Little coordination was conducted between DTC and OTC except through the ATEC System Team (AST) forum to coordinate schedules, deliverables, logistics, and reports.

The uniformed soldiers that made up a large part of the DTC workforce, categorized as soldier, operator, maintainer, test and evaluation (SOMTE) personnel were redistributed to the operational force in past Army restructuring initiatives. Most of the professional and technical civilian and contractor personnel that make up the current DTC workforce were recruited from universities and businesses, providing the test centers with little current military experience to leverage in test planning should operational doctrine, tactics, techniques and procedures be required during DT. Needless to say, when OT events are planned and executed at test centers, the conduct of independent OT events is often an activity conducted between the PM and OT team with little opportunity for the developmental tester to influence the test-fix-test methodology resulting in earlier fielding of a final product.

Operational Test Command

In contrast, OTC's mission is to test and assess systems in a realistic operational environment, using typical Soldiers to operate and maintain the system before fielding. In contrast to DTC, OTC has a mixed workforce of military, civilian and contractor personnel,

many having relevant military experience in the mission areas they represent (i.e.; fires, maneuver, aviation, logistics, transportation, etc). OTC has experienced a noteworthy relationship with the operational force since its inception in 1969 at Fort Hood where it has access to the III Armored Corps and the maneuver space necessary to operationally test systems consistent with the OTC mission [29].

The OT mission is a direct result of Section 2399, US Code Title 10 which requires independent operational testing be conducted for programs to proceed beyond certain decision points; and that PMs pay for that independent OT event, usually scheduled later in the acquisition cycle to better ensure success. Section 2399 was established in 1989 following an era of costly embarrassments including the Sergeant York Air Defense Gun, the Bradley Fighting Vehicle, the C-5 Cargo Aircraft and the B-1 Bomber. In the years that followed, DOT&E played an integral role in the successes of defense programs such as the M-1 Abrams main battle tank [30]. Because of the direction provided by Section 2399, there was little reason prior to the GWOT for operational testers to team early with PMs or developmental testers, use DT test data to defray costs in OT, leverage DT resources in the execution of OT events at DTC locations, nor expend significant effort in developing ATEC wide common instrumentation. Since test related costs such as travel and per diem are paid by the customer, early OT involvement rarely occurs.

The 1999 reorganization forming ATEC provided the structure to better facilitate earlier OT involvement and combined DT/OT test events but accomplished little to change the command's organizational culture. According to E.H. Schein, a leading theorist on organizational culture, the strength of an organizations culture is their shared history, the strength of that culture dependent on the length of its existence, and the intensity of the actual historical experiences they have shared [31]. ATEC's response to the rapid acquisition initiatives discussed earlier and effective use of available resources accelerated a changing relationship between DTC and OTC and in the process, provided the synergy to change the future T&E culture within ATEC, and may potentially influence change in DOT&E.

ATEC in Support of Wartime Test and Evaluation

Since early 2003, in response to the almost daily reports of losses to U.S. and coalition forces and non-combatant civilians, ATEC has transformed the way it conducts business to

ensure systems work effectively and get to the field as quickly as possible [32]. In transforming the commands business practices, a change in culture has also transformed.

According to Schein, the culture of any organization is formulated and impacted by several variables. The most obvious variable is the 'leader' of the organization. All things flow from the head and the values of the leader of any organization are reflected in the culture of the organization. The second variable is the influence of the members of the organization - those who joined to serve its mission. Because an organization is only as good as its people, the members have an impact on the organization's culture. These first two variables influence from "within" and are referred to as *internal* cultural variables [33].

Lastly, there are *external* variables. The culture of an organization can be influenced by cultures from "without". This influence comes from the environment. Although the impact of external variables may not be seen or felt directly, they are critical to the understanding of organizational culture and should not be ignored [34].

Leadership

The leader sets the example in the transformation process and anything short of this simply creates a culture of compliance rather than commitment. Transformation must be cultivated and nourished and begins within the heart and mind of the leader. Peter Senge, another leading theorist on organizational culture and leadership states "Most people in the organization other than the leader can't make deep changes; they act out of compliance rather than commitment." Organizations rely on the transformation of its leaders rather than the transformation of subordinates or systems [35]. John Kotter, a recognized expert on business leadership, describes leadership as a set of processes that creates or adapts organizations to significantly changing circumstances. Leadership defines what the future should look like, aligns people with the leader's vision, and inspires them to make it happen despite all obstacles [36]. As an organizations leader, the Commander must be a catalyst for change [37].

More relevant to my discussion of ATEC wartime T&E, cultural change, and leadership is that when an organization faces a crisis such as how to best provide rapid acquisition T&E support in wartime, the manner in which leaders and others deal with it creates new norms, values, and working procedures while revealing important underlying assumptions about the command and its environment. Crises are especially significant in culture creation and

15

transmission because the heightened emotional involvement during such periods increases the intensity of learning. The more intense the experiences; the more likely the organization's members will remember what they have learned and ritually repeat that behavior [38].

On 5 November 2003, MG Robert E. Armbruster, the ATEC Commander at that time, wrote and distributed a memorandum to the command, the subject being 'ATEC Support to Our Army at War' which planted the seed and set the stage for an "Army at War" mindset within the command. However, it was MG James R. Myles, ATEC Commander since June of 2004 who created the climate and ensured all members of the organization know that ATEC's support for the fight is the command's priority. This seems like a "no brainer", but support for the war has been transparent in the way many of the DoD's organizations not engaged in combat operations conduct themselves in their day to day business activities. MG Myles reiterates his message at every opportunity including staff calls, visits to remote test sites and test events, senior leader forums, commander's conferences, public addresses, and meetings with outside military and industry leaders. His message continues to promulgate throughout the subordinate commands as each organization, or elements thereof, engage in testing to support rapid acquisition programs.

One important aspect of leadership demonstrated during this timeframe was the effort to create opportunities for ATEC participation forward with deployed forces, all of which required command influence. In late 2003, Army leadership in Iraq was persuaded to approve and support an in-country visit by Colonel (COL) Rooney, then DTC Chief of Staff and ATEC lead for DTC's vehicle protection testing, to collect information on in-country fabrication of armor plating and threats. His visit was extremely successful and he was asked to stay and educate coalition leadership on test results and the hazards of inadequate locally fabricated plating. COL Rooney has made several trips since then to educate new combatant commanders in Iraq and Afghanistan [39]. That visit and further emphasis by MG Myles led to the approval of in-country ATEC test teams called forward operational assessment (FOA) teams, senior leader visits to theater, expansion of embedded liaison officers with key stake holders, and a "push" versus "pull" strategic communications philosophy within and external to the command.

Strategic Communications

The commander is responsible for strategic communications; the message to be told, the messengers responsible to communicate internally and externally to the organization, and the

vehicles to use. I limited the scope of my paper to ATEC's wartime T&E experience because the Army has been the recipient of most of the rapid acquisition initiatives to support the GWOT and more importantly, because I found little on this subject written from the other service T&E organizations. I believe this is either because their wartime T&E activities have been limited to business as usual, or because they chose not to tell their story, the latter being the most likely rationale. ATEC has encouraged the subordinate leaders and public affairs officers at each location to inform the public, DOT&E, the Army and the ATEC workforce about the great work being done across the command to support the fight.

Leadership Dialog with Army Decision Makers

MG Myles has aggressively sought ways to inform and educate the Army's senior leaders. He forged a relationship with Generals Cody (Army Vice Chief of Staff) and Schoomaker (Army Chief of Staff) that allowed ATEC's expeditionary wartime mindset to take root and make a difference, and to this end, he serves as the face to the Army and DOT&E leadership. He provides senior leaders "truth versus expectation management" concerning rapid acquisition testing, where the ground truth perspective and a bottom line up front (BLUF) capabilities and limitations (C&L) assessment is important [40].

He continuously reinforces the ATEC ideology that integrity of the test mission and product is non-negotiable to ensure the Soldier that the system he is receiving will be operationally suitable and tested by a trustworthy test organization. Often, this translates to identification of those technologies that are valuable and relevant, evolutionary and revolutionary, so those that can make an impact are nurtured accordingly to the reality of the wartime situation. This often results in recognition that a technological solution may not exist and a change to a TTP or the modification of an existing system may be the appropriate course of action to pursue [41].

MG Myles interacts with the broader Army leadership, relying on the Commanders of DTC to communicate via the long standing personal relationships with PMs, materiel developers and industry and OTC to communicate with Combatant Commanders via the leadership on the ground in theater [42]. To this end, ATEC has changed their mindset from pulling information to actively pushing information to get the word out on what they are doing and how they can help. This is an important paradigm shift since the GWOT has expanded ATECs customers,

necessitating the sharing of information to the community of stakeholders; no longer just the PM. In addition to the deployed FOA teams embedded with the Combatant Commanders, the LNOs embedded with their respective customers, ATEC marketing and the Commanding General personally communicating with stakeholders, technology is playing a big role in strategic communications [43].

Battle Update Brief (BUB)

The weekly BUB is a classified secure video teleconference (SVTC) led by the ATEC Commander bringing together the relevant stakeholders which include

- the ATEC headquarters (HQs), DTC HQs, OTC HQs
- ATEC's deployed FOA teams at each deployed in-theater location
- OTC's Intelligence Electronic Warfare Test Directorate (IEWTD)
- DTC's EPG and YPG (ATEC's primary counter-IED test sites)
- JIEDDO, the REF and China Lake since the Navy recently assumed lead role for IED interoperability testing
- TRADOC
- the PEOs and their LNOs
- the Assistant Secretary of the Army for Acquisition, Logistics and Technology

The BUB provides the Commanders a forum for situational awareness, to make decisions, provide oversight, synchronization and guidance to the FOA teams and other participants. The agenda consists of current operations, future operations and Commander's guidance. The BUB is so important, MG Myles will attend and run the SVTC from his remote temporary duty locations such as Afghanistan during a recent visit to observe FOA operations and meet with Combatant Commanders in theater [44].

Similar to the BUB is a FOA team bi-weekly SVTC with a much smaller, ATEC internal audience designed to discuss and resolve specific test or team issues not appropriate for the BUB SVTC. It also serves as a forum for leaders to convey guidance and direction to the deployed team members.

<u>ATEC GWOT Secret Internet Protocol Router Network (SIPRNET) Web Site</u>

ATEC recently created a GWOT SIPRNET site to share information with all stakeholders such as C&L reports, executive summaries, survivability test videos, test reports, FOA assessments, safety confirmations, quick look data, briefings and other good to know information. In essence, the site provides a source of reliable information made available in real-time from a source trusted with a high level of confidence. The increasing number of hits is a metric used by ATEC to gauge the popularity of the site. With the success of the site, ATEC is contemplating the stand up of a 24 hour, 7 day a week assistance hotline to put personnel in touch with ATECs experts for counter-IED and other programs [45].

<u>Public Affairs</u>

MG Myles and the subordinate commanders have encouraged the command, through the public affairs officers at each location, to tell the ATEC story. I found more than 25 ATEC generated GWOT testing related stories beginning in 2004 published in Fort Hood, YPG, EPG and APG local news papers, Army and Soldier magazines, journals, DTC Technology Reports (a quarterly DTC newsletter highlighting one of the seven test centers and DTC common news), etcetera. National conferences hosted by the Association of the United States Army, International Test and Evaluation Association, and others also provide a forum for the ATEC leadership to tell their story to Army leadership, Soldiers, the test community and material developers.

Members of the Organization

In addition to leadership, the other *internal* cultural variable Schein identifies is the members of the organization - those who joined to serve its mission. According to Schein, the process of implementing change in an organization often moves from the leader to small groups and then to the rest of the organization [46]. It is my assertion that even though wartime rapid acquisition T&E reflects a relatively small percentage of the commands total workload, the initiatives and processes are affecting more and more employees throughout the command, especially so when one considers that the GWOT and ATEC's shared wartime history has spanned four years thus far. As COL Mudd, the ATEC Chief of Staff stated in our interview, "the changes taking place in ATEC are having a cascading effect not only within the ATEC organization but within the Test Evaluation Management Agency (TEMA) and DOT&E, if not

operationally, at least their mindset . . . they are cognizant of the wartime effort ATEC is undertaking" [47]. With rare exception, ATEC is comprised of an extremely dedicated, talented workforce.

Test support directly related to the GWOT rapid acquisition initiatives is estimated to only affect 20% of the DTC total workload, primarily at APG, EPG, and YPG although the other test centers have sent technical expertise to theater to conduct testing as part of the deployed FOA teams. ATECs rapid acquisition testing affects a greater population of the OTC workforce. Within OTC, it was expressed to me that the majority of the non-staff workforce has been directly affected by rapid acquisition T&E because access to operational units for independent OT events is difficult in light of the GWOT operational tempo. As such, testing in a rapid acquisition environment has shifted the formal independent OT event in many cases to a follow on assessment of a rapidly fielded system or technology. For this reason, OTC has adopted the expeditionary role of testing forward in theater. The current six-month rotation is OTC's eighth and the personnel deploying as part of each FOA team represent a cross section of the command's test personnel. It is estimated that about 35% of the evaluation and headquarters organizations are directly affected by rapid acquisition testing based on input from the ATEC personnel I spoke to.

Most of the new hires and organizational changes as a result of the GWOT have occurred at APG, EPG and YPG and in the headquarters' rapid response divisions. The workforce at YPG alone has grown from 28 conducting IED testing to an organization of 170 military, civilian and contractor personnel testing more that 360 systems since 2004 [48]. EPG, who partnered with YPG and maintains a year round presence at YPG to conduct IED interoperability testing, hired a large number of personnel to sustain the continuous test mission.

From a cultural change perspective, many of the new personnel will eventually migrate to other test directorates or temporarily work with other test personnel, sharing the methodology, processes and tools used in rapid acquisition testing. The ATEC Test and Evaluation Basic Course (TEBC) is a required course for all new T&E employees. The Rapid Response Division briefs each class and the TEBC course has contemplated incorporating examples of rapid response testing for use in course case studies. In a similar fashion, the Defense Acquisition University (DAU) has included the Warlock counter-IED system as a case study in the TST 302

Advanced Test and Evaluation Management course under development by DAU [49].

Test and Evaluation Support in a Rapid Acquisition Environment

The most dynamic *external* cultural variable influencing changes within ATEC is ATEC's GWOT T&E support in a rapid acquisition environment. The impetus to change ATEC's focus emerged in August 2003 when the growing number of deadly IED and rocket attacks on convoys generated a multitude of military, industry and congressional interests all seeking to accelerate the fielding of potential solutions to theater. When it was evident that the armor on High Mobility Multi-purpose Wheeled Vehicles (HMMWV) and other tactical wheeled vehicles was not sufficiently protective, APG began around-the-clock ballistic and automotive testing of armor kits and up-armored HMMWVs resulting in the first kits shipped to theater following eight days of testing. Since that initial test, ATEC has tested more than 430 potential solutions [50].

In addition to ballistic testing, a full range of automotive testing was conducted at APG to determine the impact of the added armor on vehicle performance because of the additional weight from the add-on armor and greater convoy distances, speeds and lifecycle miles the tactical vehicle fleet was experiencing in theater, in almost all cases, surpassing original design and initial testing criteria [51]. Automotive performance testing was conducted on the automotive courses at YPG as well and eventually led to in-theater instrumentation and data collection by a team from both test centers.

During this same timeframe at YPG, the OSD Office of Special Projects and CTTTF funded the creation of the Joint Experimentation Range Complex (JERC). The initial JERC site consisted of 240 buildings and 14.1 miles of varying roadway built off reports from theater and representative of the urban and rural environments experienced by soldiers in combat. Initially developed to leverage YPGs unmanned aerial vehicle and sensor testing, the site was adapted to conduct around-the-clock testing and assessment of counter-IED technologies. Those technologies often resulted in technical solutions with demonstrated suitability, leading to accelerated training of troops on the system, the development of tactics, techniques and procedures (TTPs), and the rapid fielding of the system to theater [52]. Since the sites creation and recent expansion of a second JERC site to accommodate the increased counterterrorism workload, YPG has tested some 350 to 360 counter-IED systems [53].

According to Frank Apicella, Technical Director for AEC, "the acquisition process is evolving into one that uses a more iterative approach, with smaller and earlier tests as opposed to the pass/fail OT of the past. Items will be fielded as tests are ongoing, and the results of that testing will be applied to the next iteration of the system to be fielded. If the PM is planning to ship something to the troops within 60 days, we will do as much testing as we can within that time window and provide a safety confirmation as well as the report on its capabilities and limitations. That means we test it to find out if it is safe and has the potential for good use, but we tell the program manager, 'Here is what it does and does not do, and here is what you have to do to get the most effective use out of it' [54]."

In the APG and YPG examples discussed, a challenge to ATEC's leadership is conveying and emphasizing the importance of getting into the PM's decision cycle as well as building support and 'buy in' from Army senior leadership. It took considerable effort to convince the CTTTF, JIEDDO, REF, PMs and Combatant Commanders that ATEC was adapting to a changing environment. The examples that follow are some of the wartime initiatives implemented by ATEC.

Development of a Formalized Rapid Acquisition Process

Over time, ATEC developed a formalized process for the successful management of rapid acquisition initiatives which differs from traditional materiel acquisition programs. The basic difference is that rapid acquisition initiatives typically respond to an immediate need, few (if any) requirements are defined, the focus is a specific area of operation vice the full range of anticipated areas of operation, the combat developer is seldom involved, limitations are recognized wheras they are minimized in traditional acquisition programs, and the life cycle is limited with possible contractor support or disgarded when no longer operational [55].

ATEC's process consists of the development of a T&E Concept Plan which spells out a tailored limited field test for DT/OT focused on safety testing and scoped to the theater of war. The T&E Concept Plan is made up of the following sections – background, system data, evaluation strategy, milestone timeline, and conclusion. The T&E Concept Plan is designed to produce both a Safety Confirmation and a Capabilities and Limitations (C&L) Report. The C&L Report provides actionable conclusions, is complete and delivered in less than 90 days, and serves as the basis for continuous evaluation and follow-on assessments in theater [56].

Capabilities and Limitations Reports

        The C&L Report is a report prepared by the AST based on all available valid, verifiable data and information gathered during ATEC, other service, and industry testing and assessments. The C&L report is short, concise, and easy to read. The C&L Report is classified above FOUO and is intended to provide Warfighters and decision-makers essential information to assist in making informed decisions. The C&L Report is flexible and often organized as follows:

1. Executive Summary. A BLUF single paragraph assessment no longer than 150 words. The paragraph is easy to read, contains capabilities, limitations, safety risks, important employment considerations, and critical interoperability issues.

2. Purpose. A single paragraph which states the purpose of the report.

3. Mission Need. Identifies the intended capabilities and includes the Operational Need Statement number and requesting unit or organization.

4. System Description. Concise and includes pictures.

5. Data Sources. Short description of testing performed and location.

6. Test Limitations. Includes what could not be tested or assessed and why.

7. Observations. A short bulletized section based on known truth about the system that includes demonstrated capabilities and capabilities the Warfighter does not have, limitations, safety, interoperability, training, supportability, and survivability observations as well as unknowns regarding system capabilities – those things testing was not able to explore.

8. Employment Considerations. Suggestions for use which mitigate risk and leverage system advantages.

9. Recommendations. For both the user and the acquisition community.

10. References.

C&L Reports use editorial techniques such as underlined text, text boxes and bold font to highlight important items. Reports vary in length and quality based on time available, testing conducted and available reference information [57].

        The ATEC Rapid Response Division is applying Lean Six Sigma (LSS) to address inefficiencies within their processes, an important initiative as their mission and customer base is always evolving. Once a year the REF works with TRADOC to identify those systems in theater

which should be designated Programs of Record. The ATEC C&L Report and Safety Confirmation are important in that determination. The process is called Capabilities Development for Rapid Transition (CDRT) [58].

Expanded Liaison Officer Cells

Early on, ATEC established additional ATEC liaison cells embedded with organizations involved with rapid fielding (see Figure 4). According to MG Myles, "the idea was to find all the people who are doing rapid acquisition, put liaison officers (LNOs) there, and understand and plug in to who's doing what. If you don't plug in, you might find out that systems are being fielded – all for the right intentions – without ever knowing if they really work [59]". ATEC currently has a total of 21 LNO positions, the additional LNO cells for rapid response testing are located with the REF, JIEDDO, PEO Soldier, the Joint Evaluation Board and the National Training Center (NTC) [60]. The success of the LNO cells is their continuous involvement in all aspects of the communications process including the BUB.

Forward Operational Assessment Teams

Since the fall of 2004, ATEC has deployed eight OTC sponsored FOA teams to the Central Command theater of operation. FOA teams typically operate with units in Afghanistan, Iraq and Kuwait. Each team is led by an OTC Colonel and consists of soldiers and Department of the Army civilians with select mission-focused expertise from organizations throughout ATEC. The initial deployments ranged between 30 and 45 days, with six month rotations now the norm.

FOA teams reside on forward operating bases and go to unit locations to conduct interviews with soldiers and leaders about fielded equipment. They survey and interview to get various perspectives on how the equipment or technology is performing. FOA teams collect data and track system performance along with that of other items used in conjunction with the system such as Stryker, common robotics, sensors, weapon systems, vehicle safety restraints, vehicle fire extinguishers and individual and vehicle-mounted cooling systems [61].

The expertise, number of personnel, and makeup of each FOA team varies between rotations as does the number and type of systems each FOA team is to evaluate. In one 2005 example, the team consisted of 17 personnel, deployed to at least six geographically dispersed locations, to conduct operational assessments of 35 different hardware systems identified by both

ATEC and the Combatant Commanders [62]. The creation of forward deployed operational assessment teams has proven invaluable, in large part because limited access to dedicated units for operational testing has precluded the testing of separate, designed OT events with optimal soldier interface. Rapid testing with forward FOA teams conducting follow-up with heavy soldier influence are becoming the norm.

The FOA teams provide additional benefits. ATEC has embedded experimental test pilots from ATTC with deployed aviation units in Afghanistan and Iraq to conduct data collection. At the same time, they provide the unit access to aviators with unequalled experience, between 2,000 – 3,000 hours of flight experience as instructor pilots, pilot-in-command or maintenance test pilots serving as operators. Since January 2005 ATTC has deployed eight pilots with six aviation units to fly AH-64D, UH-60L and OH-58D aircraft to assess and/or test a number of aviation systems including unmanned aerial system control and integration [63]. The FOA teams also provide an improved, near real time feedback loop to and from the field which generate responsive changes to systems under development. Likewise, the FOA teams provide deployed soldiers insight into the systems they are being issued, insight they may not identify or experience on their own.

Early Operational Test Team Involvement

OTC has deployed test personnel to DTC test centers during DT to gain early insight into system performance, in particular, those systems being expedited as rapid acquisition initiatives. Examples include OT personnel from OTC's IEWTD at Ft. Huachuca deploying to YPG to observe DT testing of the Warlock counter-IED family of systems, well before OT assessments were scheduled to occur. Another example is the early participation of OT personnel during DT of the Counter-Rocket, Artillery and Mortar (C-RAM) program at YPG. C-RAM was a rapid acquisition program for Forward Operating Base defense against rocket and mortar attacks. The system was fast tracked requiring OT assessments and follow-on evaluations in the deployed theater [64].

In a long standing relationship, OT test jumpers from the Airborne Special Operations Test Directorate (ABNSOTD) at Ft. Bragg routinely participate in DT because of the limited number of test jumpers assigned to the Airborne Test Force at YPG. Participating in DT events for systems such as the Advanced Tactical Parachute System (ATPS) and the MC-6 Special

Operations Forces Tactical Assault Parachute System (SOFTAPS) provides the OT test jumpers an opportunity to get familiarized with the system throughout the DT phase of testing which improves the test planning and execution when the system goes to Fort Bragg for OT.

Combined Developmental and Operational Testing

Since 2004, the rapid acquisition environment has led to an increasing number of combined DT/OT events. One example of combined DT/OT was the Modernized Target Acquisition and Designation System (MTADS) in which the test pilots would fly two hours at YPG for DT data collection followed by two hours of OT data collection, leading to a recent combat deployment of the capability with follow-on testing by ATTC experimental test pilots in theater [65]. A more recent example is the Stryker Mobile Gun System (MGS). Because of the accelerated deployment timeline of the unit to Iraq, testing was modified to be multi-phased DT/OT with in-theater data collection by FOA Team personnel [66].

Another example is the Mine Resistant Ambush Protection Vehicles (MRAPV), a rapid acquisition initiative to field four categories of V hull up-armored systems to replace the current family of HMMWV and other wheeled vehicles for the Marine Corps and Army. Candidate systems from each category will undergo combined DT/OT and ballistic testing at APG followed by rapid procurement and fielding to theater. This is a joint Marine and Army program with the Marines designated as lead agency [67]. Although combined DT/OT is embraced differently across the command, ATEC will try to institutionalize the best practices occurring and tie it to LSS.

Testing in Realistic Environments

Testing by ATEC has occurred in realistic environments for years, whether in the field to capitalize on a training event or at a dedicated test center providing the test site, weather and terrain to replicate optimimum realistic conditions. One example is the C-RAM test discussed earlier. The test site was an isolated area of YPG, the Army's desert environment test center. The site consisted of a large compound of trailers and vans which replicated a typical tactical assembly area or base compound. The C-RAM was emplaced as it doctrinally would be emplaced in combat. Mortar teams were tactically emplaced to provide the C-RAM system realistic threat engagements.

The urban villages, surrounding landscape and varying road ways found at YPG's JERC site for counter-IED and sensor testing were made to replicate certain areas in theater and provide unequalled realism. In the same fashion, as terrorism is fought around the world it is likely systems to support the GWOT will be tested in the harsh extremes found at Alaska's Cold Region Test Center or the Tropic Regions Test Center locations in Panama, Hawaii and Surinam. It has been determined time and time again that testing systems in benign environmental chambers will identify system and component failure in many cases, but a shake out of the system exposed to the extreme environmental elements will identify system flaws not found in any chamber.

Leveraging Training Events to Conduct Testing

In order for OTC to test or assess systems in a realistic operational environment using typical Soldiers to determine whether systems are effective, suitable and survivable, operational testers have used training events to conduct testing since the commands beginning. In a wartime environment with high unit operational tempo, access to units between deployments is limited. For that reason, OTC goes where the Soldiers are, even if it means leveraging a training event. Two recent examples are the Joint Network Node system OT conducted at the NTC during 4th Brigade, 2nd Infantry Division's rotation and the MGS Initial OT conducted at the NTC with the first unit being fielded the system [68].

In both cases, test team personnel were embedded with the unit and worked closely with the NTC Observer Controllers in order to not interfere with the unit's training objectives or mission execution, a concern historically expressed by the NTC leadership. Their concern is especially important since unit training is difficult to accomplish when 30% of a unit is preparing for a third combat tour, 30% are new personnel, and home station dwell time is often reduced to less than 12 months. Since time is a premium, the training experience at the NTC is enriched and tailored to each rotation which makes testing difficult to synchronize [69]. At the completion of training exercises, the units are able to keep the equipment if desired.

Partnering Within the Command

The daily around the clock testing of systems to detect, defeat, and neutralize IEDs required the teaming of ATEC's AEC evaluators with EPG and YPG test team personnel at

YPG's JERC site. It was recognized in 2003 that YPG needed EPG's expertise in command, control, communications, computers, and intelligence systems; signal intelligence; and electronic combat/electronic warfare equipment necessary in conducting benign and interoperability testing to understand system performance and limitations. The combined test team has led to enhanced range/instrumentation development to improve the cababilities at both test centers[70]. This is just one example of the improved teaming between ATEC test organizations undertaken to respond to a rapid acquisition environment.

Joint Test Protocols

The testing of counter-IED technologies in a dynamic environment against an adaptive threat as that encountered in Iraq and Afghanistan required the establishment of a common test methodology and test protocols which meet all service objectives. ATEC led the establishment of the Joint Test Board and the joint test protocols to be used by the joint test community in the conduct of developmental, operational or interoperability testing. JIEDDO is the lead for "Red Teaming" the threat, establishing the test protocols, and working with the test community to ensure technologies are tested to adequately determine system effectiveness.

Business Transformation

I will next discuss the non-wartime *external* cultural variables influencing change within ATEC. These variables consist of the 2005 BRAC process, the implementation of LSS, and the testing of the Future Combat System (FCS) under a broad category titled Business Transformation.

2005 Base Realignment and Closure Process

DoD went through a process of internal and external organizational capability assessments for more than a year building up to the 2005 BRAC decision. Within ATEC, the BRAC analysis led to post-BRAC follow on evaluations to implement better efficiencies at every echelon of the organization.

The post-BRAC analysis conducted by DTC, an organization consisting primarily of reimbursable operated MRTFBs, led to the "Uber Lean" process of evaluating each test center's mission, functions and core competencies. That analysis identified each test center as having

primary, secondary or redundant mission area responsibilities. The next step was to evaluate each test center's facilities and range data compiled during the BRAC analysis with emphasis on utilization and operational costs, a process which identified potential capabilities and facilities that could be eliminated. The outcome led to the development of investment strategies from a holistic DTC perspective.

The DTC "Uber Lean" process served as a precursor for implementation of LSS, a methodology for cultural change and continuous process improvement [71]. At this time, many of the recommendations identified during "Uber Lean" to reduce redundancies, such as moving the inefficient indirect fire mission at DPG to either the primary mission area site at YPG or the secondary APG site, are on hold because of the GWOT. Most relevant in influencing ATEC's future is the BRAC directed relocation of ATEC HQs and AEC from leased facilities in Alexandria, VA to APG in 2010, and the direction to combine ATTC with RTTC in Huntsville, AL.

Moving AEC and the ATEC HQs to APG co-locates the HQs with DTC HQs and provides an opportunity for the command to take a hard look at the post 2010 organizational structure and command makeup. During my interviews and visits with ATEC leadership, I was impressed with the number of senior personnel thinking of the move as an opportunity for change and eager to apply LSS to combine like functions, convert some military and civilian billets, and restructure the organization for the future. Ideas discussed run the gamut and examples include converting the DTC Commanding General position to a civilian SES, eliminating some of the redundant special staff positions (legal, chaplain, etc.), and structuring the test organizations so that a single military/civilian director (COL equivalent) is responsible for DT, the independent OT, and the final report; implied and empowered to seek efficiencies and leverage resources.

Lean Six Sigma

LSS is being taught throughout ATEC to develop varying levels of expertise in each organization in compliance to an Army Business Transformation initiative. As personnel and organizations become better versed in LSS, LSS is applied to assess and improve processes at every level, such as the Rapid Response Division example mentioned earlier. ATEC's senior leadership capitalized on a recent Commander's Conference to identify strategic issues for

application of LSS.

One strategic application of LSS is to the BRAC directed consolidation at APG. Many of the leaders interviewed indicated that the move provides an opportunity to leverage the momentum and culture fostered during the war within the strategic context of BRAC to take the command to the next level. LSS will identify potential efficiencies gained during the move. One potential outcome is the elimination of like functions across the organization while still retaining the Title 10 requirement for independent OT. It may be time to address the roles of military and civilian leadership and apply LSS in that recommendation, such as less military leadership in AEC and DTC where continuity is important.

Future Combat System

FCS is the Army's first full-spectrum modernization program and will network existing systems, systems already under development, and systems to be developed to meet the requirements of the Army's Future Force. FCS is adaptable to all types of warfare and environmental conditions and will use evolutionary acquisition to develop, field, and upgrade FCS (BCT) throughout its lifecycle through a series of spin outs [72]. ATEC will have a major role in the testing of the 14 systems, soldier interface and network (the 14 + 1 + 1 concept).

In evolutionary acquisition, the entire spectrum of testing activities should be viewed as a continuous process of gathering, analyzing, and combining information in order to make effective decisions. The primary goal of test programs should be to experiment, learn about the strengths and weaknesses of the system(s), and use the results to improve overall system performance. All previously collected available data should be used in design, development, and testing at future stages, and it is recognized that OT may not be necessary at each stage of the development process [73].

OT and evaluation, as portrayed in the current milestone system, supports a decision to pass or fail before the decision is made to go to large-scale procurement. The 1998 National Research Council report *Statistics, Testing, and Defense Acquisition: New Approaches and Methodological Improvements* proposed a new paradigm in which testing should be viewed as a continuous process of information gathering and decision making in which OT and evaluation play an integral role [74]. Full-scale OT events will be practical at stages with major upgrades or substantive new capabilities, such as the spin outs in the FCS test plan. At other stages, only DT

of components and subsystems is feasible. For this reason, test events of all types should use operational realism to the extent needed to assess the performance of components and subsystems from an operational perspective [75].

To test and evaluate FCS, ATEC has a core test team at WSMR consisting of the DT, OT and evaluator expertise necessary to leverage the resources ATEC has available. ATEC will work closely with the dedicated brigade size operational unit, called the Army Evaluation Task Force, at WSMR for testing and evaluating the FCS throughout the program. FCS will combine system tests, such as the Joint Tactical Radio System (JTRS) and Warfighter Information Network–Tactical (WIN-T), into a single OT event. Testing in general will consist of several consolidated test events and both DT and OT results will be stored in a common data base along with contractor test data and all reports. ATEC and the PM will develop commonality of instrumentation and test methodology with the objective of providing a safety release three times, at each spin out, for all systems vice repetitive DT with each change or for each platform system [76].

Central to the FCS systems of systems architecture is the network. ATEC is leveraging the distributed testing capability developed at each DTC test center, the Combined Test Support Facility at Fort Hood, and the integrated joint test facility called the Inter Range Control Center (IRCC) at WSMR to test and evaluate the network, platforms and subsystems as they are tested across ATEC. The wartime rapid acquisition initiatives and cultural change demonstrated across ATEC will provide for an easier transition to the FCS evolutionary acquisition process which requires early OT involvement, testing in realistic environments, combined DT/OT wherever possible, and the cooperation and flexibility ATEC demonstrated in support of an Army at war.

Conclusion

Over the past four years, ATEC generated a synergy to support an Army at war and in the process created a cultural climate embracing acquisition reform while posturing itself for success. The 2005 DAPA review recommended, among other things, that OT be more realistic, time and resource constrained, limited in its ability to create additional performance requirements, that OT results be created that allow the Combatant Commanders to accept useful capabilities for deployment, and that systems be tested in environments against a range of threats identified by the Combatant Commander [77]. ATEC developed those very initiatives with an

expeditionary mindset to support combat operations in OEF and OIF.

Just as importantly, ATEC created a shared history within the command that was lacking prior to the war and accomplished what no other DoD T&E organization has been willing or able to do; create a culture that embraces change with a military and civilian workforce more agile, responsive and lean, in organizations that are quick and responsive, attracting and retaining the best qualified employees, and rewarding high performers, all of which are recommendations referenced in the DAPA report from an extract in the 2005 DoD Business Transformation Volume I [78].

It is my assertion that wartime T&E accelerated the implementation of many past recommended "best practices" within the Army, created a culture that embraces change, and consequently, the changes taking place in the Army may serve as a catalyst to change the institutional culture within the DoD T&E community. Many senior leaders in ATEC reinforced what Simmons stated in the article I referenced in the introduction; that significant changes in T&E are occurring right now; that change must occur from within; and as a result of that change, the future for T&E will emerge to be quite different than previously predicted.

Recommendations for Further Study and Consideration

The rapid acquisition initiatives ATEC implemented to support OEF and OIF should be shared with DOT&E for use by the other services and the international test community. The lessons learned and issues encountered over the past four years should be captured and shared as well. DOT&E should consider a joint panel analysis of the ATEC organizational structure (pre- or post-2005 BRAC move) for adaptation as a model organization for use by the other services.

I researched ATEC's Wartime T&E experience from a cultural change perspective. An important research project is the analytical comparison of formal acquisition program testing to the testing of rapid acquisition systems. Other research projects reside in case studies of the rapid acquisition systems I mentioned in my paper, such as C-RAM, MRAP and Warlock.

References

1. Larry Miller, DOT&E Live Fire, telephonic interview conducted 22 January 2007.

2. Thomas Christie, "What Has 35 Years of Acquisition Reform Accomplished?", *Proceedings*, pp. 30-35, February 2006.

3. Ibid, pg 31.

4. Kenneth Krieg, Summary of Remarks, Summary of the Joint Rapid Acquisition Workshop, 20-21 June 2006, https://acc.dau.mil/CommunityBrowser.aspx?id=105511 (accessed 17 February 2007).

5. Kenneth Krieg, Joint Rapid Acquisition Workshop, www.acq.osd.mil/usd/previous_krieg_speeches/06-20-06_Joint_Rapid_Acquisition_Workshop.doc (accessed 17 February 2007).

6. Brian Simmons, "Imperatives for T&E Change Must Come From Within," *ITEA Journal*, pp. 6-9, June/July 2006.

7. Ibid, pg. 6.

8. Ibid, pg. 6.

9. MG James Myles and Michael Cast, "Army Test and Evaluation Command Makes Rapid Acquisition a Reality," *ARMY Magazine*, pp. 42-46, September 2006.

10. *Test and Evaluation Management Guide*. (Fort Belvoir, VA: Defense Acquisition University Press), 2005, pg. 25-1.

11. Harrison Trice and Janice Beyer, *The Cultures of Work Organizations*, Value Based Management Web Site,13 August 1992, http://www.valuebasedmanagement.net/methods_trice_beyer_changing_organizational_cultures.html (accessed 2 February 2007).

12. Association of the United States Army, *The Rapid Fielding Initiative: Equipping Soldiers to Succeed*, August 2004, http://www.ausa.org/pdfdocs/IP_RapidFielding08_04.pdf (accessed 18 November 2006).

13. Ibid, pg. 2.

14. PEO Soldier, "The Army's Rapid Fielding Initiative Delivers", PEO Soldier Website, https://peosoldier.army.mil/docs/rfidelivers.pdf (accessed 22 February 2007).

15. Figure 1, Comparison between REF and Army fielding process, from REF Overview presentation by COL (Ret) Gerald Ferguson to the University of Texas Senior Service College Fellows, 30 November 2006.

16. Harold Kennedy, "Army 'Rapid Equipping Force' taking root", *National Defense*, Volume XCI, Number 635, pp. 43-45, October 2006.

17. Ibid, pg. 43.

18. Donna Miles, "Rapid Equipping Force Speeds New Technology to Front Lines," *Defense*

News, 12 August 2005, http://www.defenselink.mil/news/Aug2005/20050812_2409.html (accessed 11 February 2007).

19. Kennedy, pg. 45.

20. Figure 2, REF Project Timeline, from REF Overview presentation by Gerald Ferguson to the University of Texas at Austin Senior Service College Fellows, 30 November 2006.

21. Robert Buhrkuhl, "Acquisition Cell to Speed Up Responses to Urgent Warfighter Needs," *DefenseLINK News*, 24 November 2004, http://www.defenselink.mil/news/Nov2004/n11242004_2004112405.html (accessed 17 February 2007).

22. Greg Grant, Organization's Focus is on the Global IED Threat, *Defense News*, April 2006, http://www.defensenews.com/promos/conferences/cmd/1738941.html (accessed 13 March 2007).

23. BG Robert Cone, National Training Center presentation to the University of Texas at Austin Senior Service College Fellows, 8 February 2007.

24. Grant, pg. 1.

25. Figure 3, ATEC Mission, downloaded from the ATEC Website located at http://www.atec.army.mil/mission_intro.htm (accessed 6 March 2007).

26. *U.S. Army Test and Evaluation Command Magazine*, November 2005, pg.2.

27. Figure 4, ATEC Locations, downloaded from the Website referenced in Reference 25.

28. Brenda Bertrand, Transformation Within Organizational Culture: The Gap Between Paper and Reality, October 2002, http://www.weleadinlearning.org/bb-oct02.htm (accessed 25 January 2007).

29. Operational Test Command Website located at http://www.otc.army.mil (accessed 9 March 2007).

30. Big Dreams Still Need Oversight: Missile Defense Testing and Financial Accountability are Being Circumvented; *The Project On Government Oversight*, July 16, 2002, http://www.pogo.org/p/defense/do-020701-bmd.html (accessed 11 January 2007).

31. Edgar H. Schein, *Organizational Culture and Leadership 3rd Edition*. (San Francisco, California: Jossey-Bass, 2004), pg. 11.

32. Myles, pg. 42.

33. Bertrand, pg 2.

34. Ibid, pg. 2.

35. Ibid, pg. 4.

36. John P. Kotter, *Leading Change*. (Boston, Massachusetts; Harvard Business School Press, 1996), pg. 24.

37. Roger H. Nye, *Challenge of Command*. (Wayne, New Jersey: Avery Publishing Group Inc., 1986), pg. 31.

38. Schein, pg. 254.

39. Myles, pg. 44.

40. COL Joseph Mudd, ATEC Chief of Staff, personal interview conducted 7 March 2007.

41. Ibid.

42. MG James Myles, ATEC Commander, telephonic interview conducted 15 March 2007.

43. Dr. Vic Ramdass, ATEC Operations, personal interview conducted 6 March 2007.

44. Ibid.

45. Ibid.

46. Bertrand, pg 5.

47. Mudd, ibid.

48. Mike Cast, "Testers at YPG Help DoD Defeat Explosive Device Threats", *Army AL&T Online Monthly*, April 2007, http://www.usaasc.info/alt_online/article.cfm?iID=0704&aid=02 (accessed 15 April 2007).

49. LTC Steve Elliott, Rapid Response Division, personal interview conducted 7 March 2007.

50. MG Myles and Michael Cast, "Army Test and Evaluation Command Makes Rapid Acquisition a Reality," *ARMY Magazine*, pg. 44, September 2006.

51. Ibid, pg. 44.

52. Scott Dellicker, "Adapting to a Changing Threat is a Team Effort", *DTC Technology Report*, 1 March 2006, Report # 1-06, pages 2 and 9, http://www.dtc.army.mil/ttr/ttr1-06.pdf (accessed 3 March 2007).

53. Mike Cast, "Working to Defeat IEDs", *Army News Service*, 15 March 2007, http://www.military.com/features/0,15240,128765,00.html (accessed 26 March 2007).

54. Myles, pg. 46.

55. ATEC Briefing Slide Packet titled "Successful Management of Rapid Acquisition Initiatives" current as of 7 March 2007.

56. Ibid.

57. ATEC Memorandum, Subject: "US Army Test and Evaluation (ATEC) on Interim Guidance (IPG) 07-1, Update on Capabilities and Limitations (C&L) Reports for Rapid Acquisition Initiatives (RAI)", dated 9 January 2007.

58. Ramdass, Ibid.

59. Scott Gourley, "Knowing That It Works; Army Testing Means Better Equipment", *ARMY Magazine*, pp. 51-54, March 2006.

60. ATEC Interface - Liaison Network Organizational Chart, current as of 7 March 2007.

61. Gourley, pg. 52.

62. Ibid, pg. 52.

63. MG James Myles and Mike Cast, Army Test and Evaluation Command Supports Soldiers with Rigorous Tests - on Land and in the Air, *Army Magazine*, Volume 57, Number 1, pp. 30 and 32, January 2007.

64. Jeff Goldblatt, Pentagon Fast-Tracks Mortar Defense System, *Fox News*, 29 March 2006, http://www.foxnews.com/story/0,2933,151712,00.html (accessed 10 April 2007).

65. Myles, Ibid. pg. 32.

66. Dr. James Streilein, personal interview conducted 6 March 2007.

67. Ibid.

68. BG Christopher Tucker, presentation to University of Texas at Austin Senior Service College Fellows, 13 December 2006.

69. Cone, Ibid.

70. Scott Dellicker, "YPG Leverages EPG Cabilities", *DTC Technology Report*, 1 March 2006, Report # 1-06, pg. 4, http://www.dtc.army.mil/ttr/ttr1-06.pdf (accessed 3 March 2007).

71. U.S. Army Materiel Command Web Site, "Ready and Relevant with Lean Six Sigma; Lean Six Sigma Basics", http://www.amc.army.mil/lean/page.aspx?id=0 (accessed 2 May 2007).

72. Program Manager Future Combat Systems Brigade Combat Team, 14+1+1 Systems Overview, White Paper, 14 March 2007, http://www.army.mil/fcs/whitepaper/FCSwhitepaper07.pdf (accessed 10 March 2007).

73. *Testing of Defense Systems in an Evolutionary Acquisition Environment*. (Washington, DC: The National Academies Press), pg. 16.

74. Ibid, pg 16.

75. Ibid, pg 17.

76. COL Stephen Kreider, presentation to University of Texas at Austin Senior Service College Fellows, 12 December 2006.

77. Defense Acquisition Performance Assessment Report, January 2006, pg. 43.

78. Ibid, pg. 26.